Comparative Study of some Physicochemical Properties of Extracted Oil from Modified and Non-modified Cottonseeds

Comparative Study of some Physicochemical Properties of Extracted Oil from Modified and Non-modified Cottonseeds

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Abstract

Purpose: The objective of this study was to investigate the physicochemical characteristics of seeds oil extracted, roots and leafs from genetically modified cotton seeds and local non-genetically modified.

Methodology: Cotton seeds samples were collected from Elguziera State farms and White Nile State farms, Sudan. Collected samples were transferred to the Central research laboratory of natural and environmental resources. Oil from cotton seeds was extracted using soxhlet method, hexan was used as solvent. Determined physicochemical characteristics were pH, refractive index, specific gravity, free fatty acids, acid value, peroxide value, iodine value, saponification value, and In addition the moisture, ash, protein, fat, fiber, calcium, Iron, magnesium, Potassium, and phosphor from roots and leafs.

Findings: The two oil samples showed significantly ($P \leq 0.05$) difference in oil content, but they showed no significant difference in refractive index with a mean value of 1.47, also specific gravity; in all samples ,had value (0.94), showed significantly ($P \leq 0.05$) difference in peroxide values between Elguziera State farms and White Nile State farms; also significant ($P \leq 0.05$) difference in iodine value (7.61, 1.67, 2.18 and 1.167 respectively) was observed, saponification value (5.61,1.96, 1.96,and 4.77 respectively), free fatty acids (2.82,1.80,3.03 and 8.84 respectively), acid value (4.20,4.48,4.48 and 4.76, respectively) showed significant ($P \leq 0.05$) difference.

Keywords: *Free Fatty Acids, Iodine Value, Peroxide, Saponification, Disease Resistance, Genetically Engineered, Human Consumption*.

Introduction

Genetically modified foods (GMFs) are foods or additives derived from GMOs that are produced or treated via gene modification techniques. GMFs are also named as genetically engineered foods (GEFs) or genetically manipulated foods (Lin *et al*, 2000). Plants, animals and micro organisms have been genetically modified and used as food or food additives during last decade (Lin et al, 2000). Most of the GMOs, consumed as food, have been derived from plants (Gachet et al, 1999). Insect resistance, herbicide tolerance, disease resistance, virus resistance plants have been on the world food market. There was may types of genetic modifications on crops like, transformation for insect resistance **,**this transgenes techniques used, the most common modification involves use of cry genes for protein toxins from the soil bacterium, Bacillus thuringiensis. Another example is transformation of plant derived genes such as those encoding enzyme inhibitors or lectins to develop a source resistance to insects. The major transgenic insect resistance crops are maize, soybean, potatoes, tomatoes, canola, and rice (Jouanin *et al.*, 1998). Also, transformation for herbicide tolerance, in plants, the enzyme 5-enolpyruvylsh ikimate-3-phosphate synthase (EPSPS) plays a key role in the biochemical pathway that results in the synthesis of aromatic amino acids. (MacKenzie and McLean, 2002). and transformation for disease resistance transgenic plants containing various parts of the viral genome can be protected against virus. (MacKenzie and McLean 2002**) ,** addition for that Transformation with desirable quality genes Transgenic crops with desirable quality can be important for both food and feed production, although it remains a minor application of genetically engineered crops thus far. (Skerrit, 2000). Vegetable oils being an important ingredient of our diet act as a source of essential fatty acids and nutrition and can be extracted from a variety of plant seeds such as soybean, cotton, sesame, sunflower, safflower, palm, corn and canola (Anwar *et al.*, 2005) cottonseed oil is also widely used for human consumption. Thus, cotton has become a fiber and oil yielding crop. Its seed also contains 20-25% protein. Hence, in the future, cotton will become a source of fiber, oil and protein. (Agarwal et al., 2003). Cottonseed oil is usually used in vegetable oil mixtures (Metin et al 2003), cooking and salad oil, (Gümüşkesen 1999; Karaosmanoğlu et al 1999; Sekhar & Rao 2011). Crude cottonseed oil, which has an aroma resembling peanut and walnut, has a blurry appearance (Paralı 2003). Color of crude cottonseed oil can vary from brunette yellow to dark red due to significant amount of color pigment passing to oil during extraction (O'Brien 1998; Orhevba & Efomah 2012). In addition triglycerides, phospholipids, sterols, and carbohydrates are found in this oil (O'Brien 1998). Cotton seeds oil also has a rich source of minerals, it includes vitamin B and oil soluble vitamins such as A, D, E, K (Lukonge 2005; Sawan et al 2006). The term oil is used in generic sense to describe all substances that are greasy or oily fluid at room temperature (Buba, 2005). Fats and oils are non-volatile substance insoluble in water but soluble in organic solvent. They constitute along with protein and carbohydrates, the major food stuffs and are widely distributed in nature. From chemical point of view, oils and fats are products of the reaction between a triol (glycerol) and three molecules of fatty acids. Edible oils from plant sources are of interest in various food applications and industries. They provide characteristic flavours and textures to foods as integral diet

components (Odoemelam, 2005) and can also serve as a source of oleo chemicals (Morrison *et al.,* 1995). Vegetable oils had made an important contribution to the diet in many countries, serving as a good source of protein, lipid and fatty acids for human nutrition including the repair of worn-out tissues, new cells formation as well as a useful source of energy (Aremu *et al.,* 2013). Oils seed crops are major sources of lipids for human nutrition as well as for several industrial purposes. They are defined as those seeds that contain considerably large amounts of oil. The most commonly known oils seeds (conventional oil seeds) are groundnut, soybean, palm kernel, cotton seed, olive, sunflower seed, rapeseed, sesame seed, linseed, safflower seed, etc (Ajala and Adeleke, 2014; Aremu *et al.,2007*).

Chemical and physical properties of cottonseed oil can be divided into tests that determine the physical, chemical, and optical properties of the oil. Some properties relate directly to the composition of the triacylglycerol fatty acids; other properties are affected by the order of the fatty acid along the glycerol backbone and the relative levels of the various triacylglycerol molecules present in the oil. Melting behavior is an important property for vegetable oils used in food applications. Because vegetable oils are composed of a mixture of different triacylglycerols, it is difficult to determine a single melting point, as would be normal for pure compounds. For vegetable oils, a variety of different techniques are used to determine melting, including capillary melting point determinations, softening point determinations, slipping methods, the Wiley melting point, and the Mettler dropping point. By these various measures, the melting point of RBD cotton seeds oil is generally found to be between 10 °C and 16 °C. (O'Brien *et al.* 2005). Specific gravity (density) and viscosity are important processing properties. The specific gravity (25/25 °C) of RBD cotton seeds oil is usually between 0.914 and 0.918. Hydrogenation reduces the density of cotton seeds oil slightly.. Higher degrees of saturation tend to increase oil viscosity; hence, cotton seeds oil is slightly more viscous than most other vegetable oils. Both density and viscosity of oil tend to decrease with increased temperature. The refractive index of a vegetable oil is an easy test for the identity or purity of an oil. At 25 °C, cotton seeds oil has a refractive index between 1.468 and 1.472. The refractive index is dependent on temperature and the structure of the glycerol ester fatty acids. With predetermined curves at a fixed temperature, the refractive index is sometimes used to estimate iodine values. The smoke point is the temperature at which the oil starts to smoke when heated; the flash point is the temperature at which sufficient oil volatiles are generated to support ignition; and the fire point is the temperature at which oil combustion can be sustained. RBD cotton seeds oil with 0.04% free fatty acid levels has a smoke point around 220 °C, a flash point of near 322 °C, and a fire point near 360 °C (Jones and King 1990). Free fatty acid level is an important oil quality trait and, this is of particular concern for cotton seeds oil. It is generally measured by dispersing the oil in solvent and measuring the acidity by titration against a known concentration of sodium hydroxide. The iodine value is a simple and rapid method that determines the amount of double bonds (average unsaturation) present in a fixed amount of oil. For cotton seeds oil, iodine values of 98–118 are typical. Winterized stearin fractions and hydrogenated products have lower iodine values and winterized salad oil has slightly higher iodine values .Iodine value is widely used to monitor the progress of

winterization and hydrogenation processes. The peroxide value provides a measure of oxidation components in the oil and is generally reported as the number of milliequivalents present per kilogram of oil, which is determined by monitoring the liberation of iodine from potassium iodide. Good-quality cotton seeds oil will typically have peroxide levels of <1. The saponification value relates to the amount of potassium hydroxide that is needed to saponify a sample. In effect, it is useful for estimating the average molecular weight of the esterified fatty acids in a sample. For cotton seeds and most oleic–linoleic-type vegetable oils, the saponification value ranges from 189 to 198 with an average value of 195 . Some of possible health problems of GM food consumption: "the new proteins might a) act themselves as allergens or toxins, b) alter the metabolism of the food producing plant or animal, causing it to produce new allergens or toxins, c) or reduce its nutritional quality or value". (E.C,2010).

The nutritional quality of food may change since these foreign genes may change the level of some nutrients while decreasing the level of others. As she puts it, this might complicate "the ability of the scientists to predict the significance of the changes in pediatric nutrition" (E.C,2014). Environmental Risks can be reflected by gene flows from GM crops might affect the agriculture causing the "development of new weeds" or "more fit ones", a "loss of genetic resources", a "loss of agricultural and commercial options" and finally "unanticipated or unintended effects on agronomic traits" (E.C,2008). The effect due to gene transfer and that includes the potential risk of creating new viruses and toxins. She highlights that the virus-resistant transgenic plants might threaten other non-targeted organisms due to the toxic substances they express to the environment (Heinemann,2007). Concerning Health Peril of Genetically Modified Food, probable menace of genetically modified food consumption in animals comprise of pleiotropic and insertional effects, on animal and human health resulting from the increase of anti-nutrients, potential effects on human health resulting from the application of viral DNA in plants, possible transfer of antibiotic resistant genes to bacteria in gastrointestinal tract, and possible effects of GM foods on allergic responses. Multiple animal studies, indicate serious health risks associated with the GM food Consumption (Smith,2007 ; Finamore, et al 2008).

Materials and Methods

Materials

Plant Materials

Cotton seeds (genetically modified and non genetically modified) collecting at harvest time (November – January 2017) from Jazzier State farms and White Nile State farms.

Reagents

n-hexane , Hydrochloric acid, phenolphthalein , glacial acetic acid,. Alcohol, potassium hydroxide, sodium hydroxide, potassium iodide, carbon tetra chloride, sodium thiosulphate, toluene, iodine monochloride, ethanol, starch, and buffer solutions, all reagents obtained from CDH,(P)LTD. England,and S.d.fine.chem.limeted-India

Apparatus and devices

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Beakers, Conical flask, measuring cylinder, density bottle, safety pipette, all types were Pyrex, heat mantle, Soxhlet , Reflux condenser, refractometer , pH –meter, water bath, fume chamber, obtained from Iso Lab, Germany.

Samples collection

Samples were collected from Barakat at EL-Gazeira state and Guda at White Nile State, Sudan**.**

Design of the experiment

Standard methods were used for determining all parameters needed in this experiment.

Oil extraction

The extraction of 5.0g of cotton seeds conducted in a Soxhlet extractor using n-hexane (boiling point of 40–60 ◦C) for six hours. The oils were obtained after the solvent was removed under reduced temperature and pressure and refluxing at 70 ℃ to remove excess solvent used . Extracted seed oil was stored in freezer at−2 ◦C for subsequent physicochemical analysis. While for the cotton seed in addition to solvent extraction the crude cotton seeds were clarified using 0.5M NaOH.

Oil Yield

Each oil which was recovered by complete distilling of most of the solvent on a heating mantle was then transferred to measuring cylinder. The measuring cylinder is then placed over water bath for complete evaporation of solvent for about 2-3 hours in accordance with the method reported (pant, *etal*,2006) and volume of the oil was recorded and expressed as oil content(%) as follow

$$Oil\ content\ (\%) = \frac{oil\ weight}{sample\ weight} \times 100$$ see table (1)

Physico-Chemical Characterization

Characterization of the physical properties of oil

Determination of pH

2 gm of the sample was taken and placed in a clean dry 25 ml beaker and 13 ml of hot distilled water was added to the sample and stirred slowly. Then it was cooled in a cold water bath to 25^0C. The pH electrode was standardized with a buffer solution first and then the electrode immersed in to the sample and the pH was read and recorded (A.O.A.C, 2000).

Determination of specific gravity

The density of oil was determined using density bottle method. A clean and dry density bottle of 25ml capacity at 30^0C was weighed in gram (W_0). Then the bottle was filled with water and reweighed at 30^0C (W1). Melted oil was brought to 300C and the water was substituted with this oil after drying the density bottle and weighted again (W2) and the specific gravity was determined (A.O.A.C, 2000).

Determination of Refractive Index:

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Refractive index of an oil is the ratio of speed of light at a defined wavelength to its speed in the oil/fat itself. This value varies with wavelength and temperature, the degree and type of unsaturation, the type of substitutions of component fatty acids and with accompanying substances. Refractive index is widely used in quality control to check for the purity of materials and to follow hydrogenation and isomerization (Hoffman, 1986). The refractive index was determined using Abbey refractometers. The glass prism of the refractometer was thoroughly cleaned with alcohol to ensure that it is free from dust, a drop of oil sample was placed on the lower prism and smeared, then closed with the other covering prism and the light source of the refractometers was switched on, while viewing through the telescope. The coarse adjustment knob was rotated until the black shadow appears central in the cross wire indicator and while still viewing through the telescope, the fine knob adjustment was made until the rainbow-coloured fringe which appeared on the black dividing line disappeared, the coarse knob was rotated to give fine adjustment and make the black shadow appear exactly central in the cross wire indicator. The reading under the telescope and that of the fine adjustment knob were noted and divided by 10,000, this value was then added to the value obtained through the telescope to give the value of the refractive index of the oil at room temperature (Akpan *et al.*, 2005).

Characterization of the chemical property of oil

Saponification value

Is the number of milligrams of potassium hydroxide required to neutralize the fatty acids resulting from complex hydrolysis of 1g of oil or fat, and to saponify the esters in 1 g of the substance. It is a measure of both free and combined acids. The esters of low molecular weight fatty acids require most alkali for saponification, so that the saponification value is inversely proportional to the mean molecular weight of the fatty acids in the triacylglycerols present (Gordon 1993). Because many oils have similar saponification values, the test is not universally useful in establishing identity or indicating adulteration and should always be considered along with the iodine value for these purposes. Dissolve 35 g of potassium hydroxide in 20 ml of water and add sufficient ethanol (96%) to produce 1000 ml. Allow to stand overnight and pour off the clear liquid. Weigh 2 g of the substance into a 200-ml flask, add 25.0 ml of the ethanolic solution of potassium hydroxide and boil under a reflux condenser for 1 hour, rotating the contents frequently. While the solution is still hot, titrate the excess of alkali with 0.5M *hydrochloric acid,* using 1 ml of *phenolphthalein solution* as indicator. Repeat the operation without the substance being examined (blank test).

$$\frac{28.05\,(V2-V1)}{m}$$

V1: is the volume of titrant used in oil titration

V2: is the volume of the titrant used in blank titration

m: is the weight of the oil

The iodine value:

Iodine value is the number of grammes of iodine that combines with 100g of oil or fat. It gives the degree of unsaturation of the fat or oil (Ononogbu, 2002). This is based on the fact that halogen addition occurs at unsaturated bonds until these are completely saturated. Not all unsaturated bonds are alike in reactivity, and those near a carboxyl group hardly absorb iodine. These acids are however rare. When the double bonds are conjugated, they react more slowly than non-conjugated double bonds (Gordon, 1993). Several methods for determining iodine value are available; those in common use being the test of Wijs, Hanus and Rosenmun dkuhnhem (Gordon, 1993). The differences between the methods stated are in the halogenating agents. Fats and oils can be classified by their iodine values. The iodine values of edible oil range from about 7 to over 200. Oils with values below 70 are usually referred to as fats because they are solid at room temperature. Another group which reflect their iodine value is into drying (higher than 150), semi-drying (between 100-150), non-drying (between 70-100) and fat (70), (Simpson and Corner –Orgarzally 1986). The iodine value of the sample was determined by A.O.A.C Official Method 993.20, for iodine values of oil. The method specified by ISO 3961 (1989) was used. 0.4gm of the sample was weighed into a conical flask and 20ml of carbon tetra chloride was added to dissolve the oil. Then 25ml of iodine monochloride solution in glacial acetic (Wijs solution) was added to the flask using a safety pipette in fume chamber. Stopper was then inserted and the content of the flask was vigorously swirled. The flask was then placed in the dark for 2 hours and 30 minutes. At the end of this period, 20ml of 10% aqueous potassium iodide and 125ml of water were added using a measuring cylinder. The content was titrated with 0.1M sodium-thiosulphate solutions until the yellow color almost disappeared. Few drops of 1% starch indicator was added and the titration continued by adding thiosulphate drop wise until blue coloration disappeared after vigorous shaking. The same procedure was used for blank test and other samples. The iodine value (I.V) is given by the expression:

$$iodine\ value = \frac{12.96 \times C \times (V_1 - V_2)}{W}$$ see table (1)

Where: C = Concentration of sodium thiosulphate used;

V1 = Volume of sodium thiosulphate used for blank;

V2 = Volume of sodium thiosulphate used for determination,

W = Mass of the sample.

Determination of acid value

This is number of milligrams of KOH required to neutralize 1g of oil or fat. It indicates the amount of free fatty acid present (Ononogbu, 2002). The presence of free fatty acids in an oil or fat is an indicator of the previous lipase activity and other hydrolytic action or oxidation (Gordon, 1993). It can occur in refined oils at about 1.1% (w/w) up to as much as 15% in crude oil, but typically about 5% in crude oils (Hammond, 1993). 25ml of Toluene and 25ml of ethanol was mixed in a 250ml beaker. The resulting mixture was added to 2g of oil in a 250ml conical flask and few drops of phenolphthalein were added to the mixture. The mixture was

titrated with 0.1M KOH to the end point with consistent shaking for which a dark pink color was observed and the volume of 0.1M KOH (V_0) was noted. The required solutions were prepared with the required concentration as follows:

1-Preparation of 80 percent ethyl alcohol; 19.6 ml distilled water was added in to 80.4ml 99.5 percent absolute ethanol.

2- Preparation of 0.5N sodium hydroxide solution: 10.1 gm of 99 percent NaOH was dissolved in 500ml distilled water. The acid value was calculated as:

$$acid\ value = \frac{56.1 \times N \times V}{W}$$

Where:

V = volume of potassium hydroxide (ml),

N = concentration of ethanolic KOH,

W= sample weight

The peroxide value:

This is the mill equivalent of peroxide oxygen per 100g of fat. It is used to indicate the degree to which a fat has been oxidized. Oxidation of unsaturated oil or fat takes place via the formation of hydroperoxides. The hydroperoxides subsequently decompose in to secondary oxidation products, the majority of which have unpleasant odour and flavour. Although hydro-peroxides themselves have no off-flavours, they are an important aspect of rancidity development and is determined as the peroxide value. It is usually less than 10 per gramme of a fat sample when the sample is fresh. Place 5.00 g of the substance to be examined in a 250 ml conical flask fitted with a ground-glass stopper. Add 30 ml of a mixture of 2 volumes of *chloroform* and 3 volumes of *glacial acetic acid*. Shake to dissolve the substance and add 0.5 ml of *saturated potassium iodide solution*. Shake for exactly 1 min then add 30 ml of *water* . Titrate with *0.01 M sodium thiosulphate*, adding the titrant slowly with continuous vigorous shaking, until the yellow colour is almost discharged. Add 5 ml of *starch solution* and continue the titration, shaking vigorously, until the colour is discharged (n_1 ml of *0.01 M sodium thiosulphate*). Carry out a blank test under the same conditions (n_2 ml of *0.01 M sodium thiosulphate*).

$$peroxide\ value = \frac{10\ (\mathrm{V2} - \mathrm{V1})}{\mathrm{m}}$$

V1: is the volume of titrant used in oil titration

V2: is the volume of the titrant used in blank titration

m: is the weight of the oil (Akpan et al., 2005).

Statistical analysis

Study results were statistically analyzed in accordance to SPSS version 2021, Anova, One sample T – test.

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Results and Discussions

Table (1): Showed physicochemical parameters of oil extracted from modified and non-modified cotton seeds

Parameters	Cottonseed samples from Gazira state farms		Cottonseed samples from White Nile state farms	
	Transgenic	Untransgenic	Transgenic	Untransgenic
Oil content	10.77± 0.015[a]	8.073± 0.115[b]	6.011 ±0.005[c]	8.238 ±0.034[d]
PH	6.85 ± 1.00[a]	5.32 ± 1. 00[ab]	7.31 ± 1.00[ac]	5.66 ± 1.00[abc]
Refractive index	1.47 ± 0.100	1.47 ± 1.00	1.47 ± 1.73	1.47 ± 0.400
Specific gravity	0.942 ± 0.100	0.962 ±0.0100	0.948 ± 0.009	0.943 ± 0.019
Free fatty acid	2.82 ± 0.100[a]	1.80 ± 0.99[b]	3.01 ± 1.00[ac]	8.84 ± 0.11[d]
Acid value	4.20 ± 0.100[a]	4.48 ± 0.20[ab]	4.48 ± 0.10[abc]	4.76 ± 0.20[bcd]
Peroxide value	0.00 ± 0. 00[a]	1.00 ± 0.100[b]	0.00 ± 0. 00[ac]	1.00 ± 0.20[bd]
Iodine value	7.61 ±0.90[a]	1.67 ± 1.10[b]	2.18 ± 1.00[c]	1.167 ±0.10[d]
Saponification value	5.61 ± 0.100[a]	1.96 ± 1.00[b]	1.96 ± 0.100[bc]	4.77 ± 0.070[d]

Data are presented as means ±SE a, b, c and d value with different superscripts in the same row are significantly different at ($P \leq 0.05$).

The mean levels of oil content were highest in Gazira state farms transgenic cotton seeds10.77± 0.015 and lowest in White Nile state farms Transgenic cotton seeds 6.011 ±0.005, there were significant in pH between untransgenic Gazira state farms and transgenic White Nile state farms, but no significant differences in refractive index and specific gravity in all samples, in iodine value there were significant at all samples.

Discussions

Refractive index**:** As seen not different significantly the refractive indices of untransgenic and transgenic cotton oil that collected from Gazira state farms and White Nile state farms were 1.47±0.100, 1.47±1.00, 1.47±1.73 and 1.47±0.400 respectively. Refractive index of oil increased with increase in the number of double bonds (iodine value). In general, the refractive

indices of oils relate to the degree of unsaturation in a linear way (Rudan and Klofutar ,1999). Specific gravity**:** The specific gravity is a good indicative of purity of oil; it is depend on the number of double bonds and the chain length of the fatty acids (Nasir, 2009). The specific gravities measured at room temperature for transgenic and un transgenic cotton samples were not different significantly nearly the same being 0.942±0.1,to 0.943±0.019, respectively. The results for specific gravity and refractive index are closely associated with those reported by (Rudan-Tasic and Klofutar,1999). Acid and free fatty acid values**;** The acid value is an indicator for edibility and freshness of oils. Humidity and temperature result in increased acid value due to hydrolysis of glycerides. Higher acid value gives an idea about increased susceptibility of oils to rancidity (Nasir, *et al*.,2009). From, the acid and free fatty acids values of the untransgenic were significantly higher than the transgenic sample. Iodine value**;** Iodine value is used to assess degree of instauration of fatty acids and indicator of oxidative stability. The higher iodine value represents the greater degree of instauration (Onyeike and Juliana ,2003) Iodine values of oil from the untransgenic and transgenic cotton cultivars were differed significantly being 7.6± 0.9 to 1.167± 0.1. Our results are similar to those obtained researches before by Leibovitz and Ruckenstein (Leibovitz and Ruckenstein, 1983). Saponification number**;** Saponification value gives the idea of molecular weight of fatty acids present in oil; higher value corresponds to lower molecular weight of fatty acids (Nasir, *et al*.,2009). Saponification numbers for transgenic and untransgenic cotton were insignificantly different ($P<0.05$), they were 5.61± 0.100 to 1.92± 0.100, respectively. These results are in agreement with those reported by Sabah EL-Kheir *et al*. (2012).Peroxide values (PV); The oxidative state of tested oil can be evaluated from the combined analysis of its PV and its cox-index. Peroxide value is an index of rancidity, thus the high peroxide value of oil indicates a poor resistance of the oil to peroxidation during storage (Mohamed and Hamza ,2008). Cottonseed oils exhibited a good oxidative state as indicated by a low peroxide value (1.00 to 0.00) for transgenic and untransgenic cotton, respectively.

Conclusions

Current commercially acceptable cotton genotypes show some variation in fatty acid composition, and other components this variation is associated with both genetics and environment. The tested two varieties of cottonseeds oils were found to be quite different on the basis of variation in most of the important physico-chemical characteristics. The difference may be attributed to their different genetic properties. This study Recommend about Concern for Main tasks and methods for safety assessment of GM crops.And the biological, immunological, hormonal properties and allergenicity of GM-products must be established with the GM product isolated from the GM-crop. Also Studying the stability of oils derived from GM crops in different environmental conditions.

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